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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,047	03/28/2001	Yoshihiko Seyama	3531.65364	3083

7590

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EXAMINER

CAO, ALLEN T

ART UNIT

PAPER NUMBER

2652

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/820,047

Applicant(s)

SEYAMA ET AL.

Examiner

Allen T Cao

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- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 9-14 and 17-43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,15 and 16 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3</u> . | 6) <input type="checkbox"/> Other: _____ |

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1. Applicant's election without traverse of Group II, claims 15 and 16 in Paper No. 5 is acknowledged. Claims 1-8 will be included in the follow Office Action according to Applicant's amendment filed on 12/22/03.

2. Claims 15-16 and 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "... has a thickness larger than that providing a maximum resistance change rate or resistance change amount in the case of passing a current in an in-plane direction" in claim 15, lines 5-8 and claim 16, lines 6-9; and in claim 6, lines 2-4 is vague and indefinite. Firstly, It is unclear as to what the thickness larger than? Secondly, how the "thickness larger than that" provide a maximum change rate or resistance change amount in the case of passing a current in an in-plane direction? And thirdly, the phrase "has a thickness" as set forth, supra in claim 16, lines 6-9 and in claim 6, lines 2-4 is redundant from the limitations of the phrase "has a thickness ..." as recited in claim 15, lines 5-8 which is confusing.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 15-16 and 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al (US. 6,707,649 B2) in view of Ito et al (US. 6,636,392 B2).

Hasegawa et al disclose a spin valve magnetoresistive sensor having a first conductor 33; a second conductor 20; and a magnetoresistive film provided between the first and second conductors; wherein the MR film including a free magnetic layer 26 and a pinned magnetic layer 24 as set forth in claims 15 and 16. Hasegawa et al also inherently disclose that the "magnetoresistive film (claim 15) or free layer or pinned layer (claim 16) has a thickness larger than that providing a maximum resistance change rate or resistance change amount in the case of passing a current in an in-plane direction); see column 1, lines 58-64; column 2, lines 15-27; and column 9, line 58 to column 10, line 5. The above Office Action is appropriate included claim 6 limitations because the MR film includes the nonmagnetic intermediate layer.

Regarding claim 1, Hasegawa et al disclose that the magnetoresistive film has the free magnetic layer 26 provided on the first conductor 33; a nonmagnetic intermediate layer 25 provided on the free magnetic layer; the pinned magnetic layer 24 provided on the nonmagnetic intermediate layer 25; and an antiferromagnetic layer 23 provided on the pinned magnetic layer (in the reversed order).

Regarding claim 3, Hasegawa et al disclose that the thickness of the free layer 26 is from 20 – 100 Angstroms which is equal to 2nm to 10nm (column 8, lines 22-23).

Regarding claim 4, Hasegawa et al disclose that the pinned magnetic layer 24 has a laminated structure (layers 51-53).

Regarding claim 5, Hasegawa et al disclose that the free magnetic layer 26 has a laminated structure (layers 54, 55).

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Regarding claim 7, Hasegawa et al disclose that the nonmagnetic intermediate layer is made of Cu and its thickness is 25 Angstroms which is equal to 2.5 nm (column 8, lines 8-12).

Regarding claim 8, Hasegawa et al disclose that the free layer and the pinned layer are formed of a material selected from the group consisting of Co, CoFe and NiFe (column 7, lines 35-37 and column 8, lines 13-15).

Hasegawa et al do not disclose that the free layer and the pinned layer are made of a ferromagnetic material. Hasegawa et al only disclose that the free layer and the pinned layer are made of a magnetic layer.

Ito et al disclose a MR sensor having conductors (15, 15) and MR film including a ferromagnetic free layer, a ferromagnetic pinned layer, a nonmagnetic layer and an antiferromagnetic layer (column 2, lines 61-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the free layer and the pinned layer of Hasegawa et al with a ferromagnetic material instead of a magnetic material as taught by Ito et al.

The rationale is as follows: One of ordinary skill in the art would have motivated to make the free layer and the pinned layer of Hasegawa et al with a ferromagnetic material instead of a magnetic material as taught by Ito et al to improve the flux characteristics of the MR film, thus improve read/write characteristics of the MR sensor. Additionally, it has been held to be within the general skill of a worker in the art to select a known material having different chemical bonding structures on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125

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USPQ 416 (CCPA 1960).

5. Claim 2 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record neither discloses nor suggests a MR sensor having the combinations all limitations of claims 15 and claim 1 and further limitations of that "the thickness of at least one of said free ferromagnetic layer and said pinned ferromagnetic layer falls in the range of 0.5 to 2.0 times the mean free path of conduction electrons in a spin direction not spin-dependently scattered in a magnetization direction of said at least one layer" as recited in claim 2.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sakai et al (US006426853B1), Ho et al (US006657825B2), Freitag et al (US006624985B1), Watanabe et al (US006636391B2).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen T Cao whose telephone number is (703) 305-3796. The examiner can normally be reached on Tues - Fri (7:30 - 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen Cao
Primary Examiner

AC
March 18, 2004